[0027] In satellite navigation system links, cellular telephone links, and other long-range links, wireless signals are typically used to convey data over thousands of feet or miles. In WiFi® and Bluetooth® links and other short-range wireless links, wireless signals are typically used to convey data over tens or hundreds of feet. Extremely high frequency (EHF) wireless transceiver circuitry (e.g., WiGig circuitry) may convey signals over these over these short distances that travel between transmitter and receiver over a line-of-sight path. To enhance signal reception for millimeter wave communications, phased antenna arrays (e.g., an array of antennas **40**A in device **10**A and/or an array of antennas **40**B in device **10**B) and beam steering techniques (e.g., beam steering implemented using adjustable circuits **100**A in device **10**A and/or adjustable circuits **100**B in device **10**B) may be used. Antenna diversity schemes may also be used to ensure that the antennas that have become blocked or that are otherwise degraded due to the operating environment of device **10** can be switched out of use and higher-performing antennas used in their place.

[0028] Wireless circuitry **34** can include circuitry for other wireless operations if desired. For example, wireless communications circuitry **90** may include circuitry for receiving television and radio signals, paging system transceivers, near field communications (NFC) circuitry, etc.

[0029] Antennas **40** in wireless circuitry **34** may be formed using any suitable antenna types. For example, antennas **40** may include antennas with resonating elements that are formed from loop antenna structures, patch antenna structures, inverted-F antenna structures, slot antenna structures, planar inverted-F antenna structures, helical antenna structures, hybrids of these designs, etc. If desired, one or more of antennas **40** may be cavity-backed antennas. Different types of antennas may be used for different bands and combinations of bands. For example, one type of antenna may be used in forming a local wireless link antenna and another type of antenna may be used in forming a remote wireless link antenna. Yet another type of antenna may be used for supporting wireless power transfer operations. Dedicated antennas may be used for receiving satellite navigation system signals or, if desired, antennas **40** can be configured to receive both satellite navigation system signals and signals for other communications bands (e.g., wireless local area network signals and/or cellular telephone signals). Antennas **40** can include phased antenna arrays for handling millimeter wave communications, wireless power transfer, and other wireless operations.

[0030] Transmission line paths may be used to route antenna signals within circuitry **10**. For example, transmission line paths may be used to couple antenna structures **40** to circuitry **104**. Transmission lines in circuitry **10** may include coaxial cable paths, microstrip transmission lines, stripline transmission lines, edge-coupled microstrip transmission lines, edge-coupled stripline transmission lines, transmission lines formed from combinations of transmission lines of these types, etc. Filter circuitry, switching circuitry, impedance matching circuitry, and other circuitry may be interposed within the transmission lines, if desired.

[0031] Circuitry **10** of device **10**A and/or device **10**B may contain multiple antennas **40** (e.g., one or more antennas **40**A and/or one or more antennas **40**B). The antennas may be used together or one of the antennas may be switched into use while other antenna(s) are switched out of use. If desired, control circuitry **30** may be used to select an optimum antenna to use in circuitry **10** in real time and/or to select an optimum setting for adjustable wireless circuitry **100**A and/or **100**B associated with one or more of antennas **40**. Antenna adjustments may be made to tune antennas to perform in desired frequency ranges, to perform beam steering with a phased antenna array, and to otherwise optimize antenna performance. Sensors may be incorporated into antennas **40** to gather sensor data in real time that is used in adjusting antennas **40**.

[0032] In some configurations, antennas **40** may include antenna arrays (e.g., phased antenna arrays to implement beam steering functions). For example, the antennas that are used in handling millimeter wave signals for extremely high frequency wireless transceiver circuits may be implemented as phased antenna arrays. The radiating elements in a phased antenna array for supporting millimeter wave communications may be patch antennas, dipole antennas, or other suitable antenna elements. Transceiver circuitry can be integrated with the phased antenna arrays to form integrated phased antenna array and transceiver circuit modules. Phase antenna arrays may also be used in wireless power transfer operations.

[0033] As shown in FIG. **3**, wireless circuitry **104** may be coupled to antenna **40** using paths such as path **92** (e.g., a transmission line path). Wireless circuitry **104** may be coupled to control circuitry **30** so that circuitry **104** can be controlled by circuitry **30** during wireless power transfer operations and/or wireless communications operations. Path **92** may include one or more transmission lines. As an example, signal path **92** of FIG. **3** may be a transmission line having a positive signal conductor such as line **94** and a ground signal conductor such as line **96**. Lines **94** and **96** may form parts of a coaxial cable or a microstrip transmission line (as examples). A matching network formed from components such as inductors, resistors, and capacitors may be used in matching the impedance of antenna **40** to the impedance of transmission line **92**. Matching network components may be provided as discrete components (e.g., surface mount technology components) or may be formed from electronic device housing structures, printed circuit board structures, traces on plastic supports, etc. Components such as these may also be used in forming filter circuitry in antenna **40**. Adjustable circuitry such as circuitry **100**A and **100**B for beam steering may be interposed in paths such as path **92** (e.g., to make phase and/or amplitude adjustments for the signals handled by an associated antenna).

[0034] Transmission line **92** may be coupled to antenna feed structures associated with antenna **40**. As an example, antenna **40** may form a patch antenna, a dipole antenna, or other antenna having an antenna feed with a positive antenna feed terminal such as terminal **98** and a ground antenna feed terminal such as ground antenna feed terminal **100**. Positive transmission line conductor **94** may be coupled to positive antenna feed terminal **98** and ground transmission line conductor **96** may be coupled to ground antenna feed terminal **100**. Other types of antenna feed arrangements may be used if desired. The illustrative feeding configuration of FIG. **3** is merely illustrative.

[0035] FIG. **4** is a diagram of illustrative dipole antenna structures that may be used in implementing antenna **40**. Dipole antenna **40** has an antenna feed formed from feed terminals **98** and **100**. Left and right arms **108** extend outwardly from the antenna feed. If desired, dipole antenna **40** may have crossed dipole elements (e.g., a first dipole